

CLAIMS

What we claim is:

- 1 1. A data storage device comprising:
2 a probe tip mounted on a suspension mechanism;
3 a data storage layer;
4 at least one conducting layer wherein a capacitance is formed between the
5 suspension mechanism and the at least one conducting layer; and
6 a sensor for sensing a change in the capacitance based on a displacement of the
7 probe tip due to the presence of a bit.
- 1 2. The data storage device of claim 1 wherein the data storage layer is in contact
2 with the probe tip.
- 1 3. The data storage device of claim 2 wherein the data storage layer includes the bit
2 and the bit comprises at least one of a pit or a protrusion.
- 1 4. The data storage device of claim 1 wherein the data storage layer comprises a
2 polymer material.
- 1 5. The data storage device of claim 1 wherein the conducting layer comprises a
2 conducting thin film.

1 6. The data storage device of claim 5 wherein the conducting thin film comprises at
2 least one of a deposited metal film of Mo, Cu, TA.

1 7. The data storage device of claim 1 wherein the conducting layer comprises a
2 conducting substrate.

1 8. The data storage device of claim 7 wherein the conducting substrate comprises a
2 doped silicon material.

1 9. The data storage device of claim 1 wherein the suspension mechanism includes a
2 flexible cantilever.

1 10. The data storage device of claim 9 wherein the capacitance is formed on at least
2 one side of the flexible cantilever.

1 11. The data storage device of claim 9 wherein a first capacitance is formed on a first
2 side of the flexible cantilever and a second capacitance is formed on a second side of the
3 flexible cantilever.

1 12. The data storage device of claim 11 wherein the change in capacitance comprises
2 a difference in capacitance between the first capacitance and the second capacitance.

1 13. A method of reading data from a data storage device comprising:
2 suspending a probe tip over a data storage layer via a suspension mechanism;
3 providing at least one conducting layer wherein a capacitance is formed between
4 the suspension mechanism and the at least one conducting layer; and
5 sensing a change in the capacitance based on a displacement of the probe tip due
6 to the presence of a bit.

1 14. The method of claim 13 wherein the data storage layer comprises a polymer
2 material.

1 15. The method of claim 13 wherein the at least one conducting layer comprises a
2 conducting thin film.

1 16. The method of claim 15 wherein the conducting thin film comprises at least one
2 of a deposited metal film of Mo, Cu, TA

1 17. The method of claim 13 wherein the at least one conducting layer comprises a
2 conducting substrate.

1 18. The method of claim 17 wherein the conducting substrate comprises a doped
2 silicon material.

1 19. The method of claim 13 wherein the suspension mechanism further includes a
2 flexible cantilever and the act of providing at least one conducting layer further
3 comprises providing a conducting layer within the suspension mechanism whereby a
4 capacitance is formed between the conducting layer and the flexible cantilever.

1 20. The method of claim 13 wherein the suspension mechanism further includes a
2 flexible cantilever and the act of providing at least one conducting layer includes
3 providing a first conducting layer on a first side of the flexible cantilever and a second
4 conducting layer on a second side of the flexible cantilever wherein a first capacitance is
5 formed on the first side of the flexible cantilever and a second capacitance is formed on
6 the second side of the flexible cantilever.

1 21. The method of claim 20 wherein the act of sensing a change in capacitance
2 comprises sensing a difference in capacitance between the first and second capacitance.

1 22. The method of claim 13 wherein the data storage layer includes the bit and the bit
2 comprises at least one of a pit or protrusion.

1 23. A computer system comprising:
2 a central processing unit; and
3 a data storage device coupled to the central processing unit comprising:
4 a probe tip mounted on a suspension mechanism;

5 a data storage layer;
6 at least one conducting layer wherein a capacitance is formed between the
7 suspension mechanism and the at least one conducting layer; and
8 a sensor for sensing a change in the capacitance based on a displacement of the
9 probe tip due to the presence of a bit.

1 24. A data storage device comprising:
2 a probe tip mounted on a flexible suspension mechanism;
3 at least one capacitor coupled to the flexible suspension; and
4 a sensor for sensing a change in capacitance of the at least one capacitor based on
5 a displacement of the probe tip due to the presence of a bit.